Mid-Atlantic Coastal Ocean Observing Regional Association (MACOORA)

SEMI-ANNUAL REPORT

Reporting period 6/01/06-11/30/06

The following is a semi-annual report built upon previous such reports that commenced with the start of this three-year grant that commenced on June 1, 2005.

1.0 Progress on Regional Association Development

1.1 MACOORA (formerly MARA) held its first organizational meeting of in August, 2004. This set the stage for a series of five sub-regional meetings. MACOORA's sub-regions are organized around the major estuarine systems within the MACOORA footprint and include: Massachusetts and Rhode Island Bays and Shelf), Long Island Sound, New York Bight, Delaware Bay, and Chesapeake Bay. The sub-regional meetings were held as follows:

Chesapeake Bay	December 6-7, 2004	59 attendees
Long Island Sound:	January 13, 2005	42 attendees
Delaware Bay	January 14, 2005	18 attendees
New York Bight:	February 28, 2005	55 attendees
Massachusetts and Rhode Island Bays and Shelf:	March 15, 2005	43 attendees

Each of the meetings shared a common structure, including the following key elements and ensuring broad participation of data producers and users in the formalization of MACOORA:

- Update on IOOS
  - Overview of observing systems, existing & future technologies and applications
  - IOOS certification process; funding prospects
  - NOAA CO-OPS
- Update on MACOORA
  - Report of August Workshop
  - Next steps, aims of this workshop
- Working Group Sessions
  - User Engagement
  - Data/Product Needs
  - Governance

The outcomes from these sub-regional meetings were used to structure MACOORA's Regional Structure and Governance Summit, held on May 17-18, 2005 in Newark, DE. That meeting had 67 attendees, including 13 State and 16 Federal government stakeholders, 3 NGO's, 25 academics, and 10 industry representatives, and achieved consensus on MACOORA's mission and vision, regional governance (agreements regarding bylaws), organizational structure, and next steps and key messages, including development of business plan elements and strategies.

The Summit meeting generated the following mission statement: *MACOORA – Protecting lives, livelihood and quality of life through an understanding of marine and coastal environments*.

The Summit also produced the following Vision – Our Picture of the Ideal Future:

MACOORA is leveraging the assets of the region …

- *Citizens of all ages and decision-makers have easy access to reliable, useful real-time and forecast information about the marine environment along our coast*
- *MACOORA is viewed as an integrated network delivering value-added, cost-effective products and services to support informed decision-making for multiple constituent groups*
- *MACOORA is a catalyst for meaningful collaboration throughout the region to produce high quality science and research that captures emerging technologies for the benefit of society*
- *We have successful partnerships and collaboration within and across sub-regions in the MACOORA network*
- *We have strong advocates for the region in Congress and at the Federal, state and local levels*
- *We have strong, stable funding to sustain and grow a vibrant ocean observing system in the region*
- *We have metrics that demonstrate the tangible value of the network to the region and the Nation*
- *We are recognized as leaders in the national and international ocean observing community*

… producing benefits locally, regionally and nationally!

The Summit also identified the following strategic goals:

Goal #1: Integrate systems and data management

Goal #2: Build strong advocacy / funding for the region (planning, marketing)

Goal #3: Deliver reliable, useful products (early wins – regional success)

The Summit went on to address a number of business plan issues, including the following:

- External Opportunities
- External Threats
- Internal Strengths of MACOORA
- Internal Weaknesses of MACOORA
- Key Customers
- MACOORA Vision Discussion
- Mission Discussion
- Focus Area and Desired Outcomes / Strategies
- MACOORA Organizational Structure
- Pilot Project Discussion

We will make use of the experience and documentation from other Regional Associations, and continue development of our MACOORA rolling business plan, moving toward eligibility for regional association certification.

Given the strong marine transportation industry presence in the region, we have focused, but by no means limited, our user outreach to the ocean shipping community. This is a natural evolution of IOOS, given the existence of PORTS (Physical Oceanographic Real Time Systems) in Narragansett Bay, New Haven, New York Harbor, Delaware Bay, and Chesapeake Bay. PORTS is a well-known and respected entity in the maritime community for safe and efficient navigation, and will serve as a stepping stone for further outreach and applications. MACOORA has also had great success in engaging the commercial and recreational fisheries industry, the United States Coast Guard with their Search and Rescue (SAR), oil spill response, and national security capabilities, state and local water quality and resource management officials, and many others.

MACOORA's next major milestone occurred on December 5-6, 2005 with an Organizational Meeting in Newark, DE with the following results:

- Elected a Board of Directors - MACOORA's bylaws call for a twelve to fifteen member Board. Each sub-region selects a Board representative, subject to approval by seven at-large Board members elected by the membership. The Board itself may then add up to three additional members to assure geographic and sector diversity. Currently, the Board has thirteen members, including three industry representatives, two governmental agency representatives, two non-governmental agency representatives, and six academics (including the three principal and co-principal investigators of MACOORA grant from SURA). The members serve one to three-year staggered terms of office. Board of Director members and their affiliations are listed below.
- Accepted nearly fifty charter member organizations, representing each of MACOORA's five sub-regions as well as industry (26%), government agencies (23%), non-governmental agencies (NGO's, 6%), and academia (45%).
- Addressed the design and coordinated development of an Integrated Ocean Observing System (IOOS) in the Mid-Atlantic, as well as coordination activities with the Southeast Coastal Ocean Observing Regional Association (SECOORA). This is being facilitated through the work of MACOORA's four functional committees: Product Development Committee, User Committee, Education/Outreach/Marketing Committee, and Data Sharing & Archiving Committee.

MACOORA Board of Directors:

Massachusetts and Rhode Island Bays and Shelf
Wendell Brown
University of Massachusetts Dartmouth

Olivia Free – At-Large
Massachusetts Fishermen's Partnership

Long Island Sound
Jim O'Donnell
University of Connecticut

New York Bight
Lucy Ambrosino
Port Authority of NY/NJ

Grant Co-Principal Investigator
Scott M. Glenn - At-Large
Rutgers University

Vice Chair:
Edward Kelly - At-Large
Maritime Association of the Port of New York and New Jersey

Andrew S. Voros- At-Large
NY/NJ Clean Ocean And Shore Trust

Delaware Bay
Bob Tudor
Delaware River Basin Commission

Grant Principal Investigator and Board Chair:
Carolyn Thoroughgood – At Large
University of Delaware

Chesapeake Bay
David White *(notification of replacement pending from sub-region)*
Hampton Roads Maritime Association

Grant Co-Principal Investigator
William C. Boicourt - At-Large
University of Maryland Center for Environmental Science

Secretary:
Larry Atkinson - At-Large
Old Dominion University

Treasurer:
Jay Titlow - At-Large
WeatherFlow Inc.

On December 6, 2005, MACOORA held its first Board meeting; elected Board officers.

Another major milestone was reached on December 20, 2005, when MACOORA was incorporated as a 501(c)(3) not-for-profit corporation, establishing the Mid-Atlantic Coastal Ocean Observing Regional Association as a legal entity.

Additional MACOORA activities include:

Board of Director meetings:

- January 12, 2006 –second Board meeting (via teleconference)
- February 10, 2006 –third Board meeting (via teleconference)
- April 6, 2006 –fourth Board meeting (via teleconference)
- June 28, 2006 –fifth Board meeting, Newark, DE. A key outcome of this meeting was that MACOORA focus its efforts on inundation/coastal hazards.
- September 6, 2006 –sixth Board meeting (via teleconference)
- October 30, 2006 –seventh Board meeting, Baltimore, MD

On August 8-9, 2006, MACOORA, in collaboration with Delaware Sea Grant, convened a workshop for Mid-Atlantic Sea Grant Outreach/Extension Service specialists from Sea Grant programs of the MACOORA region (North Carolina, Virginia, Maryland, Delaware, New Jersey, Pennsylvania, New York, Connecticut, Rhode Island, and Massachusetts) to brainstorm outreach strategies for developing an Ocean Observing Outreach Network.

On September 14-15, 2006, MACOORA's Massachusetts and Rhode Island Bays and Shelf (MARIBS) sub-region conducted a Massachusetts and Rhode Island Coastal Ocean Observing System Coastal Inundation Module Design Workshop, hosted by the School for Marine Science and Technology of the University of Massachusetts Dartmouth at the Advanced Technology & Manufacturing Center (ATMC) in Fall River, MA.

On October 30-31, 2006, MACOORA held its Annual Meeting in Baltimore, Maryland, attended by 88 people. The purpose of the meeting was to further develop MACOORA's Business Plan, seek consensus on a regional ocean observing pilot project, engage a broader spectrum of stakeholders and members, and elect or re-elect four Directors of the Board.

On November 15-16, 2006, the Coastal States Organization (CSO), in collaboration with MACOORA and NOAA sponsored a Workshop on Inundation Response: Coastal Managers Needs for Coastal and Ocean Observations, with 77 attendees. The purpose of the workshop was to assess what data and products (maps, models, real-time data, etc) would be useful to mid-Atlantic Bight (Massachusetts to Virginia) coastal zone and emergency managers in responding to inundation events. MACOORA has identified inundation as an issue of initial focus for the development of a regional observing system. A key to designing such a system is an understanding of the specific needs of user groups for data and information products that would significantly improve their performance. From this assessment of needs, MACOORA observing experts can identify the appropriate technologies to employ. The workshop provided the opportunity for coastal zone and emergency managers at the local, state and regional level to articulate their needs for tools and products that would be of use.

Stakeholders that have participated in the MACOORA meetings include:

Federal Agencies (14)

- Alliance of Coastal Technologies
- EPA
- National Park Service
- NASA
- NOAA
- NOAA Fisheries
- NOS
- NPS
- NWS
- Ocean.US
- US Army Atmospheric Effects Team
- US Army Corps of Engineers
- US Coast Guard
- USGS

State/Local Agencies (20)

- DE Sea Grant
- DE Geological Survey
- Delaware Estuary Program
- Delaware River Basin Commission
- DNREC
- Hudson River NERR
- Fishers Island Ferry District
- MD Dept of Natural Resources
- MD Emergency Management Agency
- MD Sea Grant
- NJ Dept of Environment
- NJ Dept of Transportation
- NJ Seat Grant
- NJ Marine Sciences Consortium
- NY Sea Grant
- NYS Dept of Conservation
- NYS Dept of State
- SC Sea Grant
- Virginia Port Authority
- VA Sea Grant

Academic Institutions (22)

- Brookdale Community College
- Chesapeake Research Consortium
- Columbia University
- Cornell University

Johns Hopkins University
Lamont Doherty Earth Observatory
Monmouth University
Old Dominion University
Penn State University
Rutgers University
Smithsonian Environmental Research Center
Stevens Institute of Technology
Stony Brook University
University of Connecticut
University of Delaware
University of Maryland
University of Massachusetts - Boston
University of Massachusetts - Dartmouth
University of Rhode Island
University of Southern Maine
US Naval Academy
Virginia Institute of Marine Science, College of William and Mary

Private Organizations (21)

Battelle Memorial Institute
Benthos
Boeing
College Valley Enterprises
DE Bay & River Cooperative
Environmental Resource Management Inc.
Hampton Roads Maritime Association
Harbor Ops – Maritime Association of the Port of NY & NJ
JGD Associates
Maritime Association of the Port of NY & NJ
Maritime Exchange for the DE Bay
Maritrans
NY Aquarium
Orbitron Corporation
Pilots Association for the Bay & River DE
Port Authority of NY & NJ
Science Applications International Corporation
Storm Center Communications
Teledyne RD Instruments
WeatherFlow
Wheat International Communications

NGOs (8)

Chesapeake Bay Foundation
Chesapeake Bay Waterkeepers
Chesapeake Research Consortium

Gulf of Maine Ocean Observing System (GoMOOS)
Jersey Shore Partnership
Massachusetts Fishermen's Partnership
NY/NJ Clean Ocean And Shore Trust (NY/NJ COAST)
The River Project

We have established and staffed the MACOORA administrative office by retaining Dave Chapman as Executive Director of MACOORA. Dave is a naval architect by training and worked for many years with the Delaware River and Bay Authority. He most recently was employed at the University of Delaware as Marine Transportation Specialist with the University's Sea Grant College Program Marine Advisory Service, and is an active member of the American Association of Port Authorities (AAPA) and the North Atlantic Ports Association (NAPA).

We have also strengthened our capabilities for education by engaging the Mid-Atlantic Center for Ocean Science Education Excellence (MA COSEE). MA COSEE offers a unique opportunity for educators to participate in the development of innovative resources that incorporate the excitement of current oceanographic research and technology into the classroom. "Taking the Pulse of the Changing Planet" is a workshop for middle school science teachers, giving them an opportunity to integrate research science with education programs to improve access to and understanding of modern ocean science and how it affects our daily lives. MACOORA's Executive Director, David Chapman, is part of the MA COSEE team, and helped to conduct the July 2004 "Taking the Pulse of the Changing Planet" workshop, as did MACOORA Co-PI's Bill Boicourt and Scott Glenn. The New York Bight sub-regional meeting in February was attended by MA COSEE members from New York Aquarium, Stevens Institute, Rutgers University, and the University of Delaware.

In order to expand the outreach of Mid-Atlantic Coastal Ocean Observing Regional Association (MACOORA), MACOORA, in collaboration with Delaware Sea Grant, convened a workshop on August 8-9, 2006 for Mid-Atlantic Sea Grant Outreach/Extension Service specialists from Sea Grant programs of the MACOORA region (North Carolina, Virginia, Maryland, Delaware, New Jersey, Pennsylvania, New York, Connecticut, Rhode Island, and Massachusetts). Sea Grant Extension's role is to identify users of this new technology, to let potential users know what can be available to them, and to determine whether the technology can be modified to meet additional needs identified by users. The workshop provided an overview of national and regional ocean observing activities, including examples of ocean observing products and services. Participants brainstormed outreach strategies for developing an Ocean Observing Outreach Network.

In January 2005 we introduced our MACOORA website to provide information and communication capabilities, with the following elements: About MACOORA, News & upcoming events, Meetings, workshops & reports, National ocean observing - OCEAN.US, National Federation of Regional Associations (NFRA), Contact Us, Sub-regional observing

systems, Analysis & forecasting centers, Education, outreach, & research centers, including links to the Ocean.US and NFRA websites.

We are working to develop an inventory of MACOORA ocean observing systems, coordinate and integrate federal backbone and sub-regional ocean observing systems activities within the MACOORA footprint, and facilitate communication and management of data streams from multiple sources.

We have organized a team to develop pilot project candidates, including the integration of existing HF radar projects in the region and adding radar and data management equipment to augment and expand the existing network.

MACOORA continues to support the development of IOOS nationally, through NFRA.

- MACOORA implemented its three-year proposal to support MACOORA's organization, certification, and evolution as an integral player of the national IOOS effort.

1.2 Results of the sub-regional workshops are contained in the workshop reports, which are available through links on the MACOORA website, www.macoora.org, as are the proceedings of the May 2005 Summit meeting as well as the results of the December 2005 Organizational Meeting. Proceedings of the October 2006 Annual Meeting and of the November 2006 Inundation Workshop will be posted to the website shortly.

1.3 In the next year, we will make progress on preparing the business plan, engaging stakeholders, addressing DMAC and establishing education and outreach activities. The process of engaging stakeholders and preparing the business plan was a key output of the May 17-18, 2005 workshop. The December 2005 organizational workshop resulted in the election of a Board of Directors, acceptance of charter member organizations, MACOORA's first Board meeting and election of Board officers, and incorporation as a 501(c)(3) not-for-profit corporation, moving MACOORA towards RA certification.

DMAC is a critical element of our sub-regional coordination and integration efforts, and will be an integral part of our ongoing activity.

Education and outreach will center on our MA COSEE involvement, including participation in a weeklong summer workshop for middle school science teachers in Cambridge, Maryland. Additional education and outreach partners include Sea Grant Extension arms from the nine states in the MACOORA region, and seven NERRs programs within the MACOORA region.

We are currently in the process of developing our business plan, part of the Ocean.US preliminary guidelines for Level 2 Certification of Regional Associations. We have engaged former NOAA Administrator James Baker to assist in that process. At our

Annual Meeting on October 30, 2006, we adopted a business plan framework and provided input for the plan particulars.

With regard to pursuit of Regional Association Certification of MACOORA by Ocean.US, the certification criteria developed by Ocean.US have not been implemented. Note the following explanation from Ocean.US's Mary Altalo and NOAA CSC's Geno Olmi (July 27, 2006 RA Teleconference Minutes): *The NOAA lawyers are still looking for a mechanism that would allow NOAA to certify RAs, but they are becoming more pessimistic. Existing legislation does not allow it, and it appears that legislation directing NOAA to certify RAs would be required. Agencies can certify systems, from the systems engineering point of view, so certification of the RCOOSs may be the place to start. A planned configuration can be certified. The oversight body of the RCOOS would receive legitimacy though a contract to manage the RCOOS. Consideration is now being given to what mechanism can be put in place to do as much as possible of the certification by other means. At the end of the existing three year grants, the certification criteria could be included in either the selection or performance criteria for a contract or agreement.* That said, the following particulars of the unapproved certification criteria are noted:

- Level 1 - *Creation of the Legal Regional Governance Structure, The Regional Association (RA)*. It is anticipated that Level 1 certification would have been received in early 2006, had Ocean.US's RA certification process been in place (Ocean.US preliminary guidelines call for Level 1 Certification to be accomplished between June 1, 2006 and May 31, 2007).
- *Level 2- Definition of System Requirements, Inventory and Initial Implementation Phase*. Ocean.US preliminary guideline that at least one demonstration project be undertaken with users in order to qualify for Level 2 Certification makes accomplishment dependent on pilot project funding, which has not yet been secured (Ocean.US preliminary guidelines call for Level 2 Certification to be accomplished between June 1, 2007 and May 31, 2008).

2. Priorities for Observations from Regional Perspective

Coastal Observing Systems in the MACOORA Region include the following:

Overview websites:

http://www.csc.noaa.gov/coos/northeast.html
http://www.csc.noaa.gov/coos/southeast.html

Federal

National Data Buoy Center (NDBC) Moored Buoys and C-Man Stations
National Water Level Observation Network (NWLON)
Physical Oceanographic Real-Time System (PORTS)
Narragansett Bay
New Haven
New York/New Jersey Harbor
Delaware Bay
Chesapeake Bay

National Estuarine Research Reserve (NERR) System Wide Monitoring Program (SWMP)
- Waquoit Bay, MA
- Narragansett Bay, RI
- Hudson River, NY
- Jacques Cousteau, NJ
- Delaware
- Chesapeake Bay – Maryland
- Chesapeake Bay – Virginia

National Marine Fisheries Service (NMFS)
- Sandy Hook Lab

US Army Corps of Engineers (COE) – Field Research Facility (FRF) and Wave Sites
US Geological Survey Stream (USGS) Gauge Network
US Environmental Protection Agency (EPA) – Water Quality Monitoring
NASA Goddard – Coastal Monitoring Network

State and Local

New York City - Water Quality
New Jersey Department of Environmental Protection (NJDEP) – Water Quality
Maryland Department of Natural Resources – Eyes on the Bay

Academic

Chesapeake Bay Mouth Monthly Surveys
Chesapeake Bay Observing System (CBOS)
Delaware Bay Observing System (DBOS)
Johns Hopkins Applied Physics Lab (JHU/APL) - Satellite Data Acquisition Center
Long-term Ecosystem Observatory (LEO)
Martha's Vineyard Coastal Observatory (MVCO)
Monitoring Your Sound (MY Sound)
New Jersey Coastal Monitoring Network (NJCMN)
New Jersey Shelf Observing System (NJSOS)
New York City College – Satellite Data Acquisition Center
New York Harbor Observing System (NYHOS)
Regional Fisheries Applications Center
Virginia Institute of Marine Science Real-time Data

Private

Alliance for Chesapeake Bay Citizen Monitoring Program
Oceanweather, Inc.
WeatherFlow, Inc.

2.1 Identification of top five priorities for developing the National Backbone (observations, DMAC and modeling) for FY06-07 and then 08-12, as in last year's Ocean.us status and priorities report.

Our five sub-regional meetings have generated considerable input in this area. We also engaged a representative group at our May 17-18, 2005 workshop to address the issue, the results of which are included in a summary report on our website, www.macoora.org. We are sensitive to parts of the MACOORA community that have not had much to say about the priorities feel that the researchers have not included them.

Priorities for Developing the National Backbone

1. National Long-range Multi-static HF Radar network to provide surface current maps through most of the EEZ. This is the only technology capable of providing this high need dataset.
2. Sustained operational funding of the Physical Oceanographic Real-Time System (PORTS) and enhancements to the NOAA Data Buoy network which provide mostly surface data. Upgrades include more buoys for better resolution of wind and wave fields (which often vary on the larger synoptic scale of the atmosphere), the ability to place downward looking acoustic sensors (like ADCPs) on the surface moorings, and the ability to put long-range HF Radar transmitters on the larger buoys to enhance resolution and extend coverage.
3. Greater access to a larger number of satellites, including international. Negotiations with foreign governments for licensing fees. Access to more satellites reduces revisit intervals so we can begin to look at the shorter time scales of the coastal ocean. High spectral and spatial resolution further facilitates the production of coastal products. Develop a national archive for the satellite data. Many of these products may be single use by individuals, but there are many users around the country.
4. UNOLS/NOAA fleet renewal, including ships and aircraft. Observatories increase the need for coastal vessels, as does interdisciplinary research and fast response to events. More coastal vessels will be required as well as coastal aircraft. Continue to implement the plan for four national aircraft centers (east, gulf, west coasts and Alaska).
5. Data management at a national level that includes existing national centers at NOAA and NASA that makes it easier to vet and to share data.

2.2 Identification of top five Regional Ocean Observations priorities observations, DMAC, modeling, stakeholder engagement, and include pilots and research for FY06-07 and then for FY08-12.

As for Item 2.1 above, our five sub-regional meetings have generated considerable input in this area. We also engaged representative groups at our May 17-18, 2005 workshop and December 2005 Organizational meeting to address the issue, the results of which are included in summary reports on our website, www.macoora.org.

Further, our October 2006 Annual Meeting and November 2006 Inundation Workshop for Coastal Zone Managers and Emergency Managers demonstrated a region-wide need for ocean observing products that enhance coastal community resiliency, particularly as it pertains to inundation and other coastal hazards.

Regional Ocean Observations Priorities

1. Nested High-Resolution Multi-Static HF Radar Arrays to map surface currents in high interest areas like the entrances to and inside major bays and ports. Leveraging between the national network and the regional enhancements will facilitate implementation.
2. Establish sentinel stations in bays and offshore. These will be long-term observation sites using moorings and cabled observatories that emphasize long-duration continuous interdisciplinary observations, including physical and bio-optics, with high vertical resolution. These differ from the NOAA sites in that the vertical water column observations are central. The will include wave and wind sensors to further enhance the NOAA network.
3. Locally-acquired real-time satellite imagery for high use regional products. Many coastal visible products can be enhanced if local calibrations are used. The bio-optical sensors at the sentinel stations will provide the means for vicarious calibration of the local satellite products with processing priorities set locally rather than nationally.
4. Endurance lines – These will be regularly occupied sampling lines that provide subsurface spatial data required for data-based subsurface nowcasts, and by ocean modelers for assimilation into forecast models. Instrumented ferries are a good platform option for nearshore, long-duration glider AUVs are a good platform option for offshore. Approximately 5 cross-shelf endurance lines are anticipated, with ferries instrumented in all bays.
5. Regional data management. Designed to make it easier to aggregate data, produce real-time web products, to serve as a regional archive, and to interact with the national scale management structure.

3.0 Issues, Challenges and Opportunities

This should include lessons learned, issues that may need to be resolved among regions or at the national level, regional and local funding opportunities, processes not working, etc.

The challenge of going through the IOOS process in the mid-Atlantic is significant but doing it on a combined sub-regional and regional level seems to be working. However, this requires equally active participants in both the regional sense (MACOORA), the sub-regional (our five sub-regions), and even smaller sub-units such as New York Harbor or Hampton Roads. We successfully had five sub-regional meetings suggesting our approach will work in our region. How the national concept of the NFRA deals with these sub-regions that individually have significant economic benefits to be gained from IOOS might be discussed and resolved.

Funding in our region is like others; a mix of research and congressional mandates. Groups within the region are increasingly attempting the congressional mandate approach to funding. This will no doubt raise issues of ‘haves and have nots’ just as it does at the national level.

Including the maritime industry (shipping) is a real challenge but we do have their ear. Keeping them involved takes individuals ‘on the ground’ meeting with them in their offices and at their meetings, not just inviting them to our conferences. They tend to view the IOOS as a research

effort but understand that IOOS is real and they must keep their interests included while not wasting too much time on this.

4.0 Recommendations for Conferences and Workshops (issues that should be addressed, desired outcomes or deliverables, etc.). Please try to tie these recommendations to the issues, challenges, opportunities identified in 3.0

- *Annual Implementation Conference*
- *NFRA meetings*
- *Workshops, including regional industry, DMAC, or identification of others needed*

An issue related to shipping is how to effectively include the shipping industry in the IOOS process. It is critical that they have their input during the process of priority making. All aspects of the shipping industry have association offices in the DC area. Examples include the American Association of Port Authorities (AAPA), American Pilot's Association (APA), Dredging Contractors of America, International Council of Cruise Lines, Chamber of Shipping of America, American Maritime Congress, National Ocean Industries Association, American Petroleum Institute, and the American Shipping Association.

Those offices must be worked with by the national office (Ocean.US) or its representatives. The regional shipping industries will rely on the national offices for decisions. Conference specifically dealing with this may help but they cannot be 'research' driven. We need to engage them on their own turf as well, by participating in their meetings, working side by side at the committee level, and using every opportunity to solicit their input and ideas, and to promote IOOS.

Specific data management recommendations beyond the 'concrete recommendations' produced by the first DMAC must be provided very soon.

The NFRA meetings should become a 'trade association' meeting where the RAs and leaders in the sub regions if appropriate can meet to address topics of interest to them. MACOORA representatives are active participants in NFRA meetings and deliberations.

5.0 Recommendations of Additional Resource Needs (not necessarily money for the RAs, but such as: a) support of the NFRA; b) guidance on data issues (e.g., telemetry) that are relevant prior to the point where the DMAC picks up; c) guidance on modeling; d) more focused studies on the economic benefits of ocean observing; e) a funded national IOOS education effort, for example…). Again, we should try to tie these recommendations to the issues, challenges, opportunities identified in 3.0

Funding for the RAs at the level suggested originally is still valid. Many of the challenges related to data, modeling, economic benefits and education require funding.

The IOOS process calls for economic benefit studies early on in the process yet at present only a few studies have been funded. Compared to the activity in education this is a small effort yet

critical to success of IOOS: by showing its relevance economically. Since education is supported by NSF and other agencies why not focus more effort on economic studies to justify IOOS?

The Airlie House report and others gave prioritized lists of variables needed to produce needed products. Why not fund efforts to produce those products on a demonstration basis? A national surface current system nearly exists now in a research stage. Why not have a goal of creating a national system? Better access to NOAA supplied remote sensing products has also been a commonly expressed need. A focused effort to improve them would be effective.